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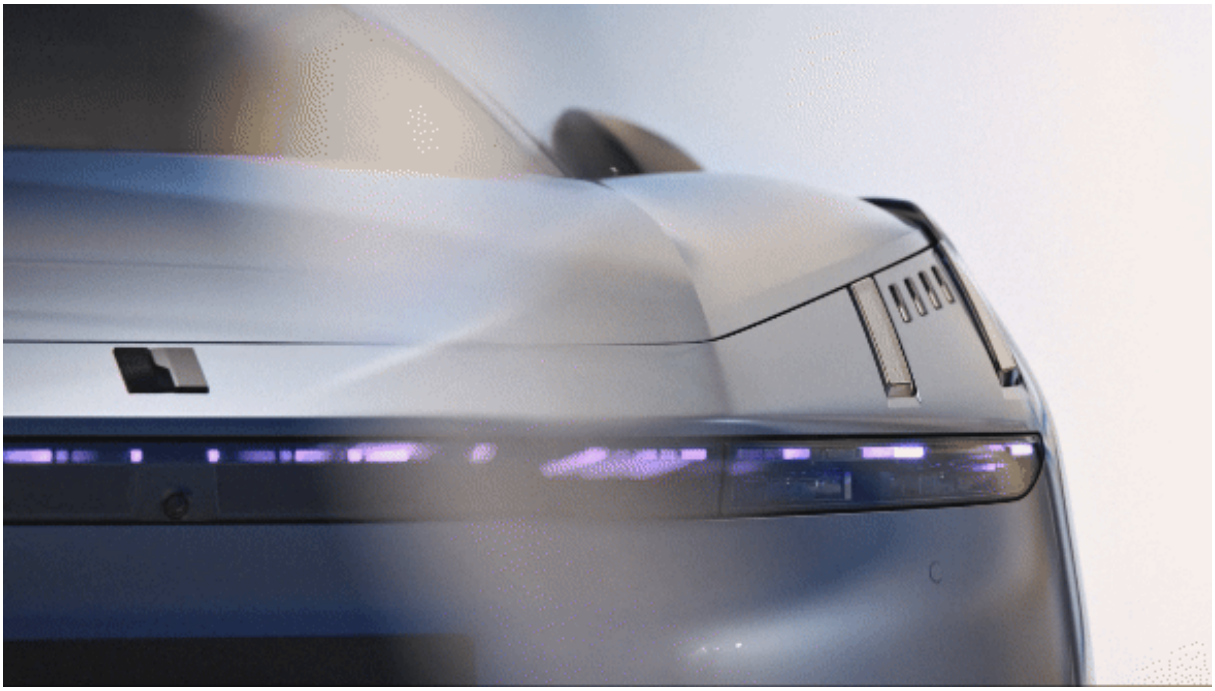
Weekly Newsletter

DVN Lighting

NEWSLETTER #873

Editorial

User Experience: New Domain For Lighting Teams



34 years ago, window-clear headlamp lenses opened new possibilities for designers—and new challenges. Now they could (and now they had to) design the inside of the lamps, too, not just the outside. This job did not exist before, and some designers chafed at what they considered a thankless, low-glamour task. "I'm here to design cars, not components!" was a complaint frequently heard in the corridors. But lighting design gained traction to became important and even glamorous. Now this job is coveted, and good lighting designers get snapped up and treated well by automakers and tier-1 suppliers.

By and by, LEDs came to be individually-drivable, thanks to pioneering work by the likes of Elmos, Texas Instruments, NXP, Infineon, Melexis, and Onsemi. This allows animated light: sequential turn signals and welcome / farewell light-dances. Things got started with around 10 LEDs, and at that scale the lamp designer can do it with Photoshop and an Excel spreadsheet shared to R&D engineers, who program it into the main lamp ECU with the support of the lamp tier-1. Quite easy.

Then came 84-pixel lamps, signals with over 200 pixels (like the Polestar 2 and Xiaomi SU7, or Audi with digital OLED). So many LEDs, so many scenarios; really too much for the Photoshop-and-Excel method. So once again, a new kind of job was created within automakers to develop the lighting experience for vehicle users. This is the UX (user experience) team, including Motion Designers, Studio engineers and SW engineers, whose complex job is to design and define the light sequences played

when the driver approaches or leaves; define the activation triggers and methods (with interior display, with phone, with voice, by default), define how many LED segments will activate, how many configurations there will be, possible updates over the car's lifetime, where to store the sequence programming (vehicle central ECU, lamp ECU), whether the automaker or one of the tier-1s will write the software…all within tight cost and time constraints.

Difficult decisions have to be made smartly to translate the design dream from a video to an LED sequence with a refresh rate appropriate to avoid flicker, with appropriate resolution and number of PWM steps, and without lag or synchronization issues left/right or front/rear while the vehicle is still partially asleep (so not all ECUs are active), and without consuming too much power. The software and hardware specifications are reciprocally dependent, so neither can be done without the other being done. Hardware specifiers need enough budget to buy ECUs with enough channels, memory, and capabilities, and software specifiers need to know what kind of hardware they're writing software for—which comes first, the chicken or the egg? And regulations in various markets differently constrain various aspects of light animations, such as their duration, intensity, and colour (like new “answer back signal” constraints in UNECE)). Gee, is that all?

But this isn't multiple disjoint worlds, it is multiple continents on one world: designers and engineers, hardware and software specialists, all working together. That was quite evident during my visit to Lynk & Co Design to talk with HMI and UX Chief Designer Louise Kivi. On the brand's Z10 model, they decided to have 414 exterior RGB LEDs. Compared to monocolour LEDs, an RGB job is more than thrice as complex—much more, actually, to manage colour matching within the HW limitation and create dynamic but still smooth movements, for examples. It was really interesting to understand how the Lynk team worked from concept to production, and to see the final result.

Some people will like it, and others might not. Me, I really like it; this is the fruit of creativity, 2024-style!

Sincerely yours,

Paul-Henri Matha
DVN Chief Operating Officer and Lighting General Editor

In Depth Lighting Technology

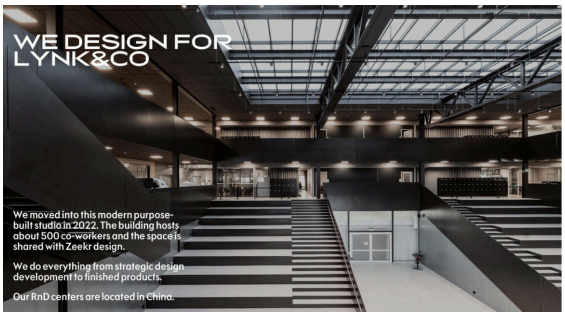
DVN Field Trip: Lynk & Co Design

I had the pleasure to visit the West Coast of Sweden—Gothenburg, Northern Europe's automotive hub. I was visiting Lynk & Co Design as a sort of distant cousin (Volvo Cars employee when I was working in Gothenburg).

Lynk & Co is a mobility provider committed to flexibility as a core principle. With a diverse range of car ownership options—subscription, lease, or purchase—Lynk & Co is actively driving the car-sharing movement. The brand combines vibrant, innovative design with pioneering connectivity solutions. Established in 2016 and headquartered in Gothenburg, Sweden, Lynk & Co uses its owned-and-operated business model to serve seven European markets: Sweden, Netherlands, Belgium, Germany, France, Italy, and Spain, and they're working to extend their presence to 22 European markets by the end of 2024. Lynk & Co champions progressive practices and tirelessly pushes boundaries for a better future for the automotive industry and for people in general.

In 2023, Lynk delivered 220,250 vehicles globally, a 22-per-cent year on year increase; the brand is growing fast—in China. It is not yet well known in Europe, so this blue Lynk & Co 01 I have in front of my house is an unusual sight in this part of the world:

Stefan Rosen, Head of Lynk & Co Design, introduced the company and their new office in a facility called Uni3, opened in 2022, at the Lindholmen campus in Gothenburg. This building is shared with Zeekr; about 500 people work there.



I had the pleasure to meet part of his team, including Creative Design Head Ivo Groen; PR Head Annica Andersson; Exterior Design Head Olivier Denamur; HMI and UX Chief Designer Louise Kivi; Expert Component Designer Thomas Hardman; Chief Component Designer Alsed Briscoe, and Senior Exterior Conceptualist Joel Hake.

Lynk & Co has 'Scandinavian DNA', which extends to their lighting systems, but with a reinterpretation for China. In Europe, and especially in Northern Europe, ambient lighting varies from infinite day during summer to whole darkness during winter; in China, darkness does not exist in megacities with a lot of artificial light everywhere.

Lynk & Co customers are also mainly aged between 20 and 30, much younger compared to the traditional European customer who is over 50. So naturally, the needs of these two buyer groups differ.

The brand has launched one car model in Europe as yet, but 11 models in China, including PHEVs and BEVs, on different Geely Group platforms. For example, the CMA shared with the Volvo XC40; SPA1 shared with the Volvo XC90, and SEA shared with Smart and Volvo EX30.

Lynk & Co Design language is in its second generation.

Front

Evolution from 01, 02, 03, 05, 06, 09 to a new expression on 08

Rear

Similar evolution from segmentation to slim lines on 08

Flat-light position lamp has been introduced on the 09 vehicle, with a floating ice block cluster.

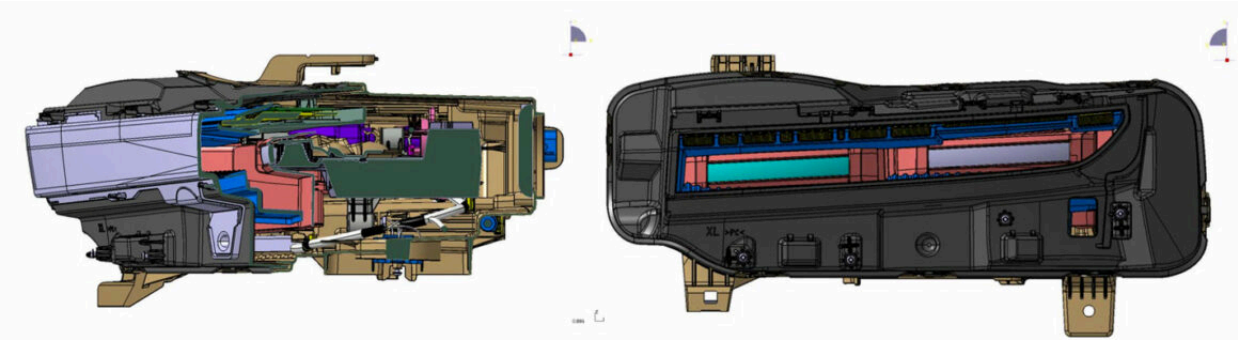
Their Z10 was launched in Gothenburg in July 2024 and is part of this second generation. The front and rear signature is in accord with the 08 signature and with the 'Next Day' concept cars presented in 2022.

The Z10 is a realistic evolution of the concept car; the front and rear signatures include a mix of thin and thick lines.

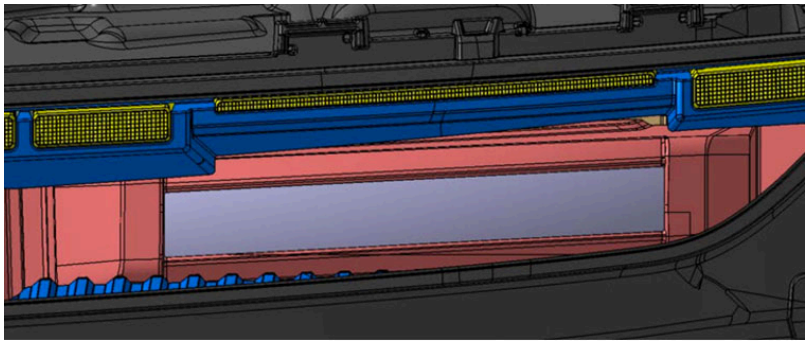
Challenges for the team included:

- Slimmest-ever Lynk & Co headlamp

The Valeo thinBiLite projector module is 15H ×120W mm.



There is a slim DRL/position light lit bridge to fulfil the 75-mm rule.



The total headlamp aperture is 44 mm.

- Top-level lighting performance: 7.95 CNAP score (out of a possible 10). Low beam gets 5.54 and high beam gets 2.41 points.
- Inspiring emotion with RGB lamps: the car has 414 RGB LEDs (out of a total led count of 864), in front and rear lamps. Communication with the vehicle's central ECU is done by CAN without any OTA updates; RGB scenarios are programmed in the local lamp ECU.

The second design language generation includes the early hours in the morning when lights are turning in different colours from blue to red; RGB LEDs enable this.

Lynk & Co customers are digital natives. They want tech to support their daily like and make it less complicated. The first RGB exterior lighting demonstrated a strong interest on social media after the Z10 reveal.

Through exterior lighting, the Lynk & Co UX design team can convey emotions to people outside the car, including pedestrians, other drivers, and the Lynk drivers themselves. These emotions soften the car as a metal machine and give it more of a human touch. This creates a more harmonious connection for the car, to build a stronger relationship. It is not 'just a car' anymore.

To define welcome / farewell scenario, Louise Kivi is supported by five people. The main difficulty for the UX team is to translate the design wishes into the lamp's

software, including possible effects of PWM—such as flickering and refresh rate due to LED activation, and LED IC and ECU management.

This problem, well known to all those who work on welcome / farewell scenarios at any automaker's lighting team, is much more complex to address when you have to manage RGB LEDs with the mixing of the three colours. Lynk & Co Design team are using Adobe AfterEffects for this purpose, along with an in-house converter called Aurora2 to design, simulate, test, and include the scenarios in the lamp software.

According to a Lynk & Co marketing study, 42 per cent of Chinese customers are ready to pay more money for RGB exterior lighting features.

Lighting News

Status: GRE Lights-While-Parked Task Force (TF LUPC)

LIGHTING NEWS

Up to now, there's been no clear regulation of what lights may be activated, and how, on a vehicle while it is parked. As a result, there are vehicles on the road which activate a variety of their lights and lamps when locking and unlocking the doors (and, more recently, while charging, while signalling 'welcome' or 'farewell', etc). There is concern such activations could cause distraction or discomfort to other road users; Japan expressed this concern during the 84th Session of GRE in April 2021. The expert from Japan proposed amendments (doc 1 · doc 2 · doc 3) to UN Regulation № 48 to introduce parked-vehicle lighting and an 'answer-back signal'.

The Chair found that the proposal needed additional consideration and refinement, and GRE proposed to establish a special interest group (SIG) on these topics, SIG R48-09, co-chaired by the experts from Finland and the Netherlands. The SIG met nine times between June 2021 and March 2023, and a final proposal was submitted at the 88th GRE session in April 2023. Following deep consideration of the document, GRE adopted the technical content as revised.

Highlights

- Definition of an 'Answer-Back Signal' as a signal used to assist the vehicle user to identify and find their parked car. It may flash and/or change intensity and/or apparent surface. All the specific technical requirements are listed in §6.27 of R48 series09.
- Modification of the activation rules for the exterior courtesy lamps, which may be switched on and/or off manually automatically, and may change intensity and/or apparent surface, but may not flash.
- Certain lamps may provide a courtesy light function; these include the rear position, parking, side marker, and end-outline marker lamps, as well as all

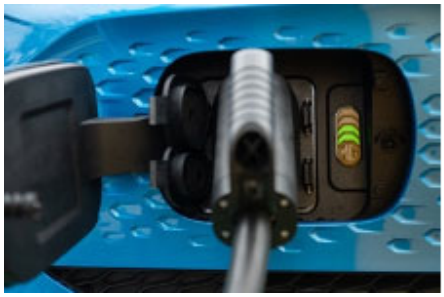
exterior lamps which provide white light except the DRLs, the high beam headlamps, and the reversing lamps

These modifications were introduced in the new 09 series of amendments to R48, which was submitted to WP.29, adopted during the March 2024 session, and entered force on 22 September,2024.

SIG 48-09 Becomes TF LUPC

During the 89th GRE session, it was agreed to transform SIG 48-09 into the Task Force on Lamps Under Parked Conditions (TF LUPC) with a mandate until December 2025. Japan and the Netherlands act as co-chairs, while OICA acts as Secretary. The task force's objectives are to review the current requirements for lighting on parked vehicles, and to develop a proposal for energy indicator (e.g., charging status) lighting and lamp test modes. These new signals were submitted to GRE during the 88th session, but were not adopted.

Here are some examples of existing charging status indicators:



So far, three task force meetings have been held. The task force submitted two questionnaires to the UNECE Secretariat who sent them to all GRE attendees. The answers will be compiled and analysed during the 4th meeting of TF-LUPC, to be held on 3 October.

The task force will submit an informal document to GRE during the April 2025 session, and the formal document will be submitted to GRE during the October 2025 Session.

LED-on-Foil: ams OSRAM's New Aliyos

LIGHTING NEWS

ams OSRAM have announced the next iteration of their Aliyos LED-on-foil technology for automotive applications. This method combines ams OSRAM Aliyos technology with Leonhard Kurz's in-mold decoration (IMD) and functional foil bonding (FFB) technologies. By applying heat and pressure in the post-mold, hot stamping FFB process, Aliyos LED foils are integrated behind various covers. Combined with IMD surface decoration, the result is unparalleled design flexibility, enabling light to emerge from surfaces in ways never before possible.

The Aliyos demonstrator with FFB and IMD technology showcases four distinct, ultra-thin light panels, each featuring unique surface designs and lighting effects. With 32 individually-addressable red segments per panel, these designs show captivating light patterns hinting at the prospects to elevate the vehicle interior and exterior lighting user experience. When switched off, the light source is invisible, creating the effect of light appearing out of nowhere when switched on.

Segments can be individually formed with the Aliyos technology, creating incredibly detailed and sharp visuals. Full-range brightness control for each segment enables dynamic, interactive lighting to upgrade vehicle æsthetics. Constraints due to the complexity, energy intensity, or installation size of components are alleviated, and so new lighting functions can be smoothly integrated into a car’s design.

ams OSRAM and Leonhard Kurz will introduce their jointly-created demonstrator at SIA VISION 2024 in Paris shortly, on 16-17 October.

Tayron Shows VW Light Signature's Next Step

LIGHTING NEWS

Volkswagen will soon launch their new Tayron SUV in Europe, after the first generation of that model's availability exclusively in China. The new Tayron departs completely from the China-only car, and it is a wholly different animal; specifically, a stretched and redesigned Tiguan.

In Europe, the Tayron will replace the outgoing Tiguan Allspace; the premiere is scheduled for 10 October 2024.

The lighting system includes a rear lit logo; new evolution of the rear signature with slim microöptical blocks, and headlamps with two slim modules (estimated height is 35 mm).

Keysight to Buy Synopsys Optical Group

LIGHTING NEWS

Keysight Technologies, a major electronic measurement company based in Santa Rosa, California, have agreed to buy Synopsys' Optical Solutions Group, a developer of optical design and analysis software tools. The transaction is subject to customary closing conditions, including review by regulatory authorities and the successful closing of Synopsys' proposed acquisition of Ansys, which is pending regulatory approvals and is expected to close in the first half of 2025.

Keysight say the Optical Solutions Group will bring a suite of software solutions for optical systems design, analysis, simulation, and virtual prototyping, as well as a team with deep industry expertise. This will facilitate Keysight's plans to broaden their design engineering software portfolio and build on their core positions in radio frequency and microwave electronic design automation, as well as physics-based computer-aided engineering capabilities.

Niels Faché, VP and GM of Keysight's Design Engineering Software activity, says the acquisition will "give us the capabilities to enable high-performance system use cases beyond electronics, including optics and photonics".

And Synopsys Systems Design Group GM Ravi Subramanian says, "We are proud of Synopsys' Optical Solutions Group, which has developed leading optical design tools backed by an expert team of optical engineers and scientists. Keysight will be an excellent future steward for this team, and customers worldwide will benefit from continued, strong competition in the development and delivery of optical design solutions".

Rehau Propose Polyurethane Paint for Front Fascias

LIGHTING NEWS

Rehau Automotive have bought a complete ColorForm system from KraussMaffei— an MX 2300 SpinForm with spin platen and automation, as well as a RimStar-Compact 8/8 ColorForm—at their plant in Feuchtwangen, and have been demonstrating what the car front ends of the future could look like.

A decoratively-printed IML film is automatically cleaned and transferred to the first mould cavity by a robot. This is then processed in several steps to create a front panel with a high-quality look, which is finally coated with a self-healing IMC polyurethane protective layer in the mould.

The entire process is integrated into the MC6 machine control system. An automated process allows the sequence with and without PUR painting, and if a pre-molded part is detected as faulty or off-spec by the system, it is ejected and not covered with the PUR layer. The process is determined on the basis of the data collected, which is provided to the customer in high resolution by KraussMaffei's dataXplorer. The dataXplorer documents up to 520 machine signals from the injection moulding machine and dosing system, with a resolution as close as five milliseconds, and saves them in curve sequences. This allows the user to view the entire process as if under a microscope. A file is created for each cycle, ensuring complete traceability.

For PUR painting, an MX 2300 SpinForm with spin platen and 23,000 kN clamping force, a RimStar Compact 8/8 ColorForm metering system and automation work together in harmony.

DVN Pune Workshop

LIGHTING NEWS

DVN Pune gathered around 450 people to talk about lighting and the main challenge for the Indian ecosystem.

See the link to be able to see all the presentations as if you were part of the event.